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3. *Home and School Series.* Macmillan, New York, N.Y. Edited by Paul Monroe.

   A new series of six volumes; three volumes by H. S. Curtis on *Play;* others on general principles of education.

4. *School Efficiency Series.* World Book Co., Yonkers-on-Hudson, N.Y. Edited by Paul H. Harnus.

   A series of thirteen volumes comprising the reports of the New School Inquiry, covering in "survey" form the various fields of school practice; enlarged to include *Portland Survey* and other volumes.

5. *Educational Survey Series.* World Book Co., Yonkers-on-Hudson, N.Y.; Chicago.

   Publication of various school surveys in permanent form.

6. *Riverside Monograph Series.* Houghton Mifflin Co., Boston. Edited by H. Suzzalo.

   An important series of monographs written in non-technical language covering many aspects of education, especially the teaching of various subjects.

II. COMMENT ON CURRENT EDUCATIONAL WRITINGS

A. A CRITICAL REVIEW OF THREE NEW TEXTBOOKS ON HIGH-SCHOOL MATHEMATICS

In recent years the sociological emphasis in education has brought about three very distinct movements which effect the reorganization of the mathematics course of study. The first has revealed a distinct vocational demand for the modification of the subject-matter of mathematics and has shown three important aspects, the agricultural, the commercial, and the industrial. The second movement has revealed itself in an insistent demand for economy of time: first, economy of time in the minimal essentials of the subject-matter; and second, economy of time in teaching and learning. The third movement has called for the rearrangement of the subject-matter of mathematics in the intermediate grades, the results of the organization of the grades being called quite generally the junior high school.

In response to these demands three types of books have appeared in recent years, each claiming that it is an improvement on the old order of things because it responds to one of these demands. During the past five years several "agricultural mathematics" have appeared in which the essentials of arithmetic are applied specifically to the problems of the farm. In the same way a score of business arithmetics have appeared, applying that subject-matter to the commercial and trade activities. Finally, during the past six years a number of "shop" or "applied mathematics" books have appeared, each of which has attempted to apply arithmetic and the fundamentals of algebra and geometry to the specific situations which are met in particular industries and trades. This latter movement has assumed implicitly that boys leaving school in the ninth, tenth, and eleventh grades go into these trades. This, however, has not yet been established by quantitative investigation, and it is doubtful if it is true.

In all of this modification of the course of study there may be seen the gradual acquiescence of school teachers of mathematics in social pressure of a purely utilitarian sort. Three books[1] which have been issued within the past two months typify various aspects of these important movements of the modification of this traditional course of study in high-school mathematics.

The Keal and Phelps textbook is a distinct attempt of the school man to work out

> the sequence of mathematics that would enable the student to recognize fundamental principles and apply them in shop, drawing-room, and laboratory, and second, to so develop the course that each year's work would be a unit and not depend upon subsequent development for the application of that work.

It should be pointed out that books that have applied mathematics to the later occupational needs of children have not been founded upon detailed investigation of these later occupational needs. The Keal and Phelps textbook is the first to be constructed. The review editor gives it as his judgment that it is the best compromise text that has yet appeared in the field of secondary mathematics, which places in the hands of the teacher a systematic presentation of fundamental quantitative devices, the latter having been compiled with definite reference to occupational needs. The book is a most radical innovation from the standpoint of the currently used algebras. The teacher of any one of the most popular first-year algebras at the present time will perhaps be shocked at the lack of conformance to traditional order in the presentation of topics, and to the very slight emphasis upon many of the so-called fundamentals of first-year algebra (for example, factoring). Among the strong points of the book we can note great emphasis upon concrete material (for example, graphic illustrations, "scales"), use of levers for the exhibition of positive and negative numbers, a rather good use of the protractor for angle measurement, and a heavy emphasis on graphic illustration of fundamental processes. There is a good treatment of ratio and a very desirable emphasis upon the important topic of evaluation.

The book, however, is an interesting exhibit of the one-sided point of view that school men are now taking in their construction of textbooks. With the present emphasis upon fitting the course of study to social needs the teacher has been even less inclined than before to equip himself adequately with psychological technique and to organize the subject-matter of his books in terms of a careful analysis of the psychology of learning in the subject in question. The Keal and Phelps book is organized about certain situations which

[1] H. M. Keal and Nancy S. Phelps, *Secondary Mathematics*, I. New York and Chicago: Atkinson Mentzer, 1917. Pp. 224.

W. L. Vosburgh and F. W. Gentleman, *Junior High-School Mathematics, First Course*. New York: Macmillan, 1917. Pp. vii+146.

E. R. Breslich, *Third-Year Mathematics for Secondary Schools*. With logarithmic and trigonometric tables and mathematical formulas. Chicago: The University of Chicago Press, 1917. Pp. xviii+331+tables, 125 pages.

are so highly specialized that certain chapters are almost "non-teachable" to the average student. It is extremely difficult to defend the detailed content of chapter vi on "pulleys, gears, and speeds." In the remainder of the book there is not revealed such an unusual emphasis upon specialized situations, but it is clear that from the standpoint of the psychology of "learning" the book must be said to be *traditional.* By this we mean that in it there has been very little consideration of the step-by-step process by which children *learn* to handle intelligently the fundamental devices for quantitative thinking, namely, the equation, the formula, and the graph. We find on page 1, for example, that the pupil is taught to represent numbers by letters *without* adequate introductory material. Through the chapter there is revealed in the organization of the problems this same lack of recognition of the need of systematic psychological study of the learning process and careful grading of the subject-matter. The other chapters, in the main, do not make adequate use of "graphic representation," the graph being taken up systematically in the last chapter of the book. Chapter ii on evaluation illustrates again the lack of "psychologizing." The student is given two pages of definitions and is then at once plunged into the "evaluation" of very difficult problems. In forming a judgment of this book we feel, therefore, that, whereas it has probably the best selection of *fundamental quantitative materials in first-year mathematics, it has, like all other mathematics books which are being published at the present time, failed decidedly from the standpoint of "learning."*

In this connection Mr. Breslich's book, although a third-year book, not comparable in content with the Keal and Phelps book, is a distinct attempt to psychologize from the broader standpoint the organization of subject-matter in mathematics. His three-volume series is the most striking example which has appeared in years of the movement for the combining of essentials of geometry with the essentials of algebra. The extent to which the author has recognized problems of learning is seen in his attempt to merge, to unite, to fuse, these important groups of mathematical subject-matter called algebra and geometry. In this connection the editor's reaction to the author's attempt is that it is an interesting beginning in a most difficult and important field of educational study. It must be pointed out in this connection that the author is primarily interested in the preparation of students for the college and the university. This *Third-Year Mathematics* is designed primarily as a third unit, as a year's work, to follow the first two unit courses of work of the author in *First-Year Mathematics* and *Second-Year Mathematics.* It completes the study of high-school mathematics with algebra, trigonometry, and solid geometry. Without doubt these series of books represent the most important single example of the movement for unified mathematics in this country.

During the past year several books appeared which are designed to satisfy the demand for a unified course in mathematical instruction in the seventh, eighth, and ninth years. We already have heard of many successful attempts to combine the essentials of algebra and geometry in the seventh and eighth grades.

To do this successfully we need systematic textbook material. The Vosburgh and Gentleman *Junior High-School Mathematics* is a rather successful, traditionally organized mathematics book of this type. Their "unit course" in mathematics includes first a brief review of the arithmetic ordinarily covered by the first six grades. The equation is made use of early as a simple mathematical tool. In this connection the use of ratio is introduced and used in simple mathematical development. Measurement and decimals are introduced, and measurement of angles is taken up by the use of a protractor as a decimalized ruler. The interpretation of number data is made by means of graphs. Equations are applied to the formulas of mensuration, and percentage, discount, and interest, in addition to these other items, are included in the first-year course. These authors do recognize the need for more careful grading of problem-work.

The detailed scheme of this book as well as of the preceding two reveals, however, that *the fundamental psychological weakness in mathematics textbooks centers around the poor grading of problems.* Problems should be carefully graded in types of *gradually increasing* complexity and difficulty. It is easy to point out in these books as well as in the currently used traditional books *important gaps in the graduation of problem-work.* The other psychological weakness revealed by these books is that the subject-matter is organized in such a way as to be too remote from the pupil's experience. It is too abstract.

We may sum up, then, by commending the writers of these books upon the improvement of the content of the subject-matter of first-year mathematics, upon the elimination of much dead wood in the mathematical curriculum, and upon the tendency to adapt mathematics more closely to social needs. *It is clearly evident that important advances are being made.* On the other hand, *from the standpoint of the psychological criterion,* analysis of textbooks in high-school mathematics shows that *little or no advance has been made up to the present time.* It seems to us that the best attempt made in this field is that of Mr. Breslich, but that his chief contribution is in leading the way in the reorganization of the subject-matter found in algebra, geometry, or trigonometry.

B. A BOOK ON STATISTICAL METHODS APPLIED TO EDUCATION

One of the "Riverside Textbooks in Education" is Mr. Rugg's new book *Statistical Methods Applied to Education.*[1] The subtitle of the book, *A Textbook for Students of Education in the Quantitative Study of School Problems,* indicates the field which the book is expected to cover. Many school administrators who have long since forgotten much of their mathematics and who, in consequence, have been somewhat worried over the introduction of the statistical method of dealing with school problems will feel a sense of relief when they read in the author's preface that "it is possible to explain rather

[1] Houghton Mifflin Co., Boston and Chicago: 1917, $2.00.

completely the reasons for and the significance of the principal statistical devices without expressing the explanation in technical mathematical language." This book has been written with the deep-rooted conviction that this course is the proper one, and with a complete recognition of the limitations in mathematical equipment of the average school administrator and teacher. One must feel that the author has undertaken a very necessary and important kind of work when he attempts to show how statistical work in education may be studied and used without specializing in mathematics. As a result of this attempt Mr. Rugg has produced a book of some four hundred pages, but, on carefully studying each chapter, one does not find an unnecessary sentence in the entire book.

The book is a result of actual classroom work by the author with seven of his graduate classes in education. The men in these classes were all practical school men, including not a few superintendents, and the book therefore represents in part their reactions to the author's methods of presentation.

The book is divided into ten chapters. It seems to fall naturally into four great divisions: first, introductory, in which Mr. Rugg sets forth the uses which may be made of statistical methods in education, indicates the best way of quoting educational facts and some of the pitfalls which should be avoided, and shows how to tabulate with accuracy and dispatch the educational data which have been gathered.

Secondly, he deals with the method of computing averages. He discusses thoroughly and in a very clear manner the distinction between the statistics of variables and of attributes, how to throw the data into frequency distributions, and the plotting of the frequency curve. Under the heading of "averages" he discusses the mode, median, and arithmetic mean. These three methods of averages, the author feels, are all that the most of school men will ever need, but he includes also a discussion of the harmonic mean and the geometric mean. One of the most valuable parts of the chapter on averages, which is indicative of the desire of the author to be of real service to his reader, is the discussion of the use of the "different measures of central tendency." One not only wants to know how to do a certain thing, but also desires to know how to use it after he has done it.

Thirdly, the book deals with the measures of variability, the use of the normal frequency curve in education, and the measurement of relationship. Here are discussed the four measures of variability: the range, the quartile deviation, the standard deviation, and the mean deviation.

Chapter vii is a discussion of the frequency curve. It is one of the few chapters with which those who are not mathematically inclined will have any difficulty. The discussion of permutations and combinations might be criticized upon the ground that it is too technical, unless one considers that the text is intended for the use, not only of school administrators, but also of specialists in research work. For the use of the latter such a chapter is absolutely essential.

The discussion of the "measurement of relationship" in chapter ix, which includes methods in the computation of the correlation and regression coefficients and probable error, may also present difficulties to the average school man, but one cannot very well see how the discussion could be clarified, nor how it could be left out of a book on statistical methods.

The fourth great division is chapter x, and is in many respects the best presentation of the "use of tabular and graphic methods in reporting school facts" which has yet been published. One must feel that in this chapter the author has succeeded to a remarkable degree in answering that vexing question, How is one to *use* his knowledge of statistical methods? There are many graphic methods presented for reporting school facts which should prove to be invaluable to a progressive school administrator. Plate I, entitled "A Tabular Survey of the Published Quantitative Studies on School Administration," is a successful graphic device for putting the reader in immediate touch with the literature of the different phases of school administration. Five in all are studied, such as standardization of the course of study, the teaching staff, school machinery, and the pupil; school finance and business management; school organization and administration. The use of the plate is fully explained in the text.

The bibliography is remarkably well chosen and annotated and covers a wide range of studies on school administration. The appendix is divided into three parts: Appendix A is a selective bibliography of statistical methods, which is probably the most practicable which has yet been published; Appendix B is an explanation of the formulae and symbols used in the text; Appendix C includes ten tables for facilitating computation. The author has used 80 diagrams and 68 tables to illustrate the various processes which he describes. These diagrams and tables are well chosen.

It is very evident that the text will appeal to practical school administrators for use in determining many important school facts about their own systems, will aid in interpreting reports on other school systems, and will give meaning to their professional reading. In these days, when educational books and magazines fairly bristle with such terms as "frequency curve," "probable error," "median," "coefficient of correlation," etc., the school man who does not understand what these terms mean soon finds himself very much at sea.

This book should also prove invaluable to the heads of departments of research. These departments are being created very rapidly in our large school systems, and the heads of the departments will find that this book will be to them what a classical dictionary is to a teacher of Latin.

The third group which will use this book with profit is composed of students in our departments of education. Every up-to-date department of education is requiring some work in statistical methods, and as yet there has been no textbook which has fully met this need. The book is so planned and written that it will be useful, not only as a reference book, but also as a textbook. At the close of each chapter there are illustrative problems which may be worked by the students. These are adapted from the author's *Illustrative Problems in Educational Statistics*, which has been published to accompany this text.

Mr. Rugg's book is a real contribution to the science of education, and one ventures to prophesy that it will be found on the desk of every progressive school man in the country.

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III. BRIEF DESCRIPTIVE STATEMENTS OF NEW PUBLICATIONS

1. *Apprenticeship and Apprenticeship Education.* Colonial New England and New York. Seybolt. Cloth, 8vo, pp. 121. Teachers College Contributions to Education, No. 85, 1917.

Historical dissertation dealing with early trade education; describes rise of the apprenticeship system in England and its transplanting to the American colonies. Educational aspects of the practice of apprenticeship in New Plymouth and Massachusetts Bay colonies, Connecticut, New Haven, and Rhode Island colonies, and in New York province are indicated. Based upon legislation, court orders, indentures, wills, and other original sources; appendix contains a few transcripts of original documents; extensive bibliography of source material.

2. *Lancasterian System of Instruction in Schools of New York.* Reigart. Cloth, 8vo, pp. v+105. Teachers College Contributions to Education, No. 81, 1917.

An intensive study in the history of education, treating of part played by the monitorial plan in the development of New York City's public-school system from 1805 to 1853, describes origin and rise of Lancaster's plan and gives reason for introduction into New York, deals quite specifically with school organization and classification of pupils, and gives specimens of floor plans, curricula, and programs. Methods of teaching reading, arithmetic, science, manual training, and religious and moral education are indicated. School inspection, teacher-training, and the good and evil effects of the system are discussed. Good bibliography and analytical table of contents.